Educating Girls and Women for the 21st Century: Its Significance to Canada's Economy

Background Document prepared for the Joint Meeting of Federal-Provincial/Territorial Ministers Responsible for the Status of Women and Provincial/Territorial Ministers Responsible for Education

Calgary, Alberta
September 23, 1991

92-07477/

Acknowledgement

This background document is based on a research paper prepared by E.B. Harvey and J.H. Blakely for the joint meeting of Federal-Provincial/Territorial Ministers Responsible for the Status of Women and Provincial/Territorial Ministers Responsible for Education.

EDUCATING GIRLS AND WOMEN FOR THE 21ST CENTURY: ITS SIGNIFICANCE TO CANADA'S ECONOMY

Executive Summary

In the years ahead, Canada will face increasingly strong competition from other countries in international trade. To compete successfully, Canada will have to devote greater effort to developing the knowledge and skills of its citizens. In the opinion of economists today, the single most important factor in a country's prosperity will be a well-educated and highly skilled labour force[1]. No sector of our population can afford to be neglected.

Statisticians tell us that over the coming decades the number of Canadians of working age will grow more slowly than in the recent past. As the pool of available workers shrinks, finding people with the levels of knowledge and skill required for many jobs will become increasingly difficult.

Most of the new entrants to Canada's labour force over the next 30 or 40 years will be women -- women who are not in the work force now, such as homemakers or those who are seeking to re-enter it. The proportion of women who choose to enter the labour force and succeed in doing so will be an important factor in Canada's level of prosperity.

Over the past 20 years, the growth in Canada's labour force has been accompanied by a rise in the Gross Domestic Product (GDP). The GDP is a measure of the total of goods and services produced in Canada (excluding exports) and a useful indicator of the nation's economic well-being. Calculations based on past trends suggest that Canada's GDP will rise significantly in future decades if women participate in the labour force on an equal basis with men. The GDP will rise even higher if women attain levels of education equal to those of men, participate in different fields of study in the same proportions as men, and eventually enter occupations spanning as broad a range as is evidenced among men. The importance of such equality to Canada's ability to compete and prosper is clear -- if educational opportunities for women are enhanced and diversified so that they can choose to enter the labour market in a greater variety of occupational roles, Canada's economy will emerge stronger and more vigorous.

Despite the promise of these benefits, Canadian women continue to find many doors still closed as they seek opportunities to contribute to their country's economy. This paper therefore raises several issues concerning policy direction and program development to foster the achievement of equity in education. These include the following:

- broadening the educational choices of girls and women and thus the range of occupations they subsequently enter;

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[1] The term "labour force", as used throughout this report, includes civilians 15 years and older who are either employed or unemployed but available and actively looking for work (by registering, for example, at Canada Employment Centres). This is the meaning given the term by Statistics Canada. It therefore excludes homemakers, volunteers, or any other people doing unpaid work.

- development of strategies to attract more female students into the fields of science and technology;
- encouragement of female students to persevere in their studies and attain higher levels of education;
- meeting the unique educational needs of immigrant women and girls;
- provision of ways to enable older students to balance work and family responsibilities with their needs for further education and training;
- addressing the needs for basic education of women with low educational levels;
- considering retraining initiatives for older women.

Introduction

Canada today faces increasingly powerful competition in the arena of international trade. World trading patterns are changing with the expansion of free trade, and newly industrialized countries like South Korea and Taiwan have established themselves as contenders in the global marketplace. The knowledge and skills developed by a nation's people are increasingly viewed as more important to the economy than natural resources or financial capital. Under these changing circumstances, Canada's prosperity depends heavily on its ability to develop a highly and appropriately skilled labour force, able to apply new technologies to the production of goods and services that can find a market in other countries.

If Canada is to compete on an equal footing in world trade, its policy-makers must pay increasing attention to developing what economists call "human capital" -- people with the knowledge and expertise demanded by today's advanced economies. As Robert B. Reich observes in *The Next American Frontier*:

> Financial capital formation is becoming a less important determinant of a nation's well-being than human capital formation. Financial capital is highly mobile. It crosses international borders with the speed of an electronic impulse. International savings are flowing around the globe to wherever they can be put to use. The eagerness of Western bankers to recycle petrodollars to Poland and other high-risk countries is evidence enough. But a nation's store of human capital is relatively immobile internationally, apart from a few high-flying scientists and engineers. The skills, knowledge, and capacity for teamwork within a nation's labour force will determine that nation's collective standard of living.

How well is Canada doing in building up its "store of human capital"? This question is examined from several points of view in the following sections of this paper.

- Section 2 forecasts the distribution of Canada's population of working age. It shows that this part of the population will grow more slowly than it has in the recent past. The supply of workers in many fields may become scarcer.

- Section 3 presents various pictures or "scenarios" of Canada's labour force in the future. These pictures vary depending on the growth, or lack of it, in the participation of women in the labour force.

- Section 4 looks at various patterns and trends related to the education and employment of women. It shows that women remain a minority in certain educational fields and are still confined to a narrow set of occupations.

- Section 5 examines the effect on Canada's economy of the different pictures of the labour force presented in Section 3. The effect is most positive when the patterns of labour force participation are similar for both men and women. This means that women's rates of participation approach those of men across *all* age groups, reaching equality with them

by the end of the forecast period. The closer the pattern of female labour force participation resembles that of men, the greater the contribution to Canada's economic growth (as measured by GDP).

- Section 6 shows that even higher gains to GDP would occur if women were equally represented in the various types and levels of education (e.g., in engineering) so that they could perform jobs across the full range of occupations.

- Section 7 outlines desirable directions for public policy in the light of the conclusions reached in this paper.

Population Projections

Canada's labour force has grown rapidly over the past two decades, chiefly because of the large number of women who have chosen to enter it. The availability of more skilled workers has in turn stimulated the country's economy and boosted its productivity. However, the birthrate drop in recent years threatens to reduce the size of Canada's labour force and slow the pace of economic growth.

Exhibit 2.1 shows the growth in the Canadian labour force by sex between the years 1971 and 1986.

Exhibit 2.1

The Labour Force by Sex, Canada, 1971-1986

Year	Female ('000)	Male ('000)	Total ('000)	Percent Change
1971	2,831	5,800	8,631	---
1976	3,859	6,449	10,308	19.4
1981	4,802	7,019	11,821	14.7
1986	5,523	7,347	12,870	8.9

Source: *The Labour Force*, Ottawa: Statistics Canada, various years.

As the exhibit shows, the labour force grew by 49% over the 1971–1986 period, rising from 8.6 to almost 12.9 million. Much of this was due to a sharp increase in the number of women who entered the labour force. While the male labour force increased by 27% (from 5.8 to 7.3 million), the female labour force climbed from 2.8 to 5.5 million, an increase of 95%.

When we look at the pattern of Canadian labour force growth during this period, two conclusions become evident. First, economic growth was fuelled largely by growth in the amount and diversity of labour available. During these fifteen years, GDP shot up by 75% and productivity (measured as GDP/population) rose by almost 48%. Second, the labour force growth that

stimulated economic growth resulted from an increase both in the number of women entering the labour force and the number choosing to stay in it. In other words, the increased labour force participation and retention of women between 1971 to 1986 was a major factor in the country's economic growth.

The low birthrates of recent years suggest that the labour supply will be tighter in future. To test this prediction, we have projected Canada's working age population (15 to 64 years) over two 25-year periods, 1986 to 2011 and 2011 to 2036[2].

Exhibit 2.2 illustrates the results of the projection. It shows that over the first 25-year period (1986–2011) the Canadian population will rise from 25.4 to 30.2 million, an increase of 19.3%. In contrast, the increase during the second forecast period (2011–2036) is projected to be much smaller -- up to 31.5 million or a growth of only 4.1%. Both these rates of population growth are much lower than that during the 25-year period ending in 1986.

Exhibit 2.2

A Projection of the Canadian Population, 1986-2036

Year	Population		% of Total Population		Population aged 15-64	
	Total ('000)	Percent Change	Age 15 or less	Age 65 or more	Total ('000)	Percent Change
1986	25,353	—	21.3	10.6	17,265	—
1991	26,514	5.37	20.6	11.8	18,059	4.60
1996	27,851	4.26	19.7	12.8	18,799	4.10
2001	28,785	3.35	18.6	13.5	19,545	3.97
2006	29,563	2.70	17.3	14.3	20,221	3.46
2011	30,236	2.28	16.3	15.8	20,530	1.53
2016	30,814	1.91	15.8	18.1	20,368	-0.79
2021	31,265	1.46	15.5	20.6	19,978	-1.91
2026	31,546	0.90	15.1	23.3	19,469	-2.55
2031	31,642	0.30	14.6	25.6	18,922	-2.81
2036	31,567	-0.24	14.2	26.8	18,625	-1.57

One of the most significant findings of this projection is a decline in growth of the population aged 15-64 after the year 2011. This age group generally provides the bulk of the labour force. Between 1986 and 2011, this group is expected to grow in number by 18.9%, about the same as the population as a whole. Between 2011 and 2036, however, the population aged 15-64 is expected to shrink in number by 9.3%. (In contrast, between 1961 and 1986

[2] For a description of the procedures and assumptions required for these projections, see Appendix A.

this group increased at a faster rate than the total population.) By 2036, then, if these projections hold true, the population balance in Canada will shift dramatically, with a much larger number of older people (65 and over) and fewer of typical working age.

What do slowing population growth and shifting demographic patterns mean for Canada's labour supply? Since we will be unable to rely as heavily on traditional sources, such as young people graduating from the education system, new sources must be developed and encouraged. Women who are not currently in the labour force or who are seeking to re-enter could provide a fresh source of labour supply.

Labour Force Forecasts

Four different forecasts for Canada's labour force were developed to see what it might look like if female participation stays the same as now or if it rises to equal that of men[3]. The forecasts or "scenarios" range from a "worst-case" scenario, in which women's rates of participation in the labour force stay about where they are now, to a "best-case" scenario, in which their rates equal those of men by the end of the forecast period (2036). For discussion purposes, we will look only at the most negative (worst-case) and most positive (best-case) outcomes of these predictions.

Results of the worst-case scenario are presented in Exhibit 3.1, those of the best-case in Exhibit 3.2. In the former, the labour force grows by 19.4% to 15.4 million in 2011, then shrinks by 8.4% over the next 25 years to 14.1 million. In the latter, however, it grows by 33.7% between 1986 and 2011, reaching 17.2 million, before dropping by 7.8% to 15.9 million by the year 2036. Under the best-case scenario, the labour force will include almost 1.8 million more people.

To foster growth of this magnitude, public policy-makers should encourage women who want to enter the labour force, assist them to re-enter it if they have withdrawn, and help them stay in it as long as they wish. Following are examples of some incentives that could be offered -- making affordable child care more widely available; providing education and training designed to help women over 45 re-enter the labour force; offering more basic literacy and job skills programs for women with less than Grade 9 education; and continuing to implement programs of equal pay for work of equal value.

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[3] For an explanation of the procedures and assumptions involved in these forecasts, see Appendix B.

Exhibit 3.1

Labour Force Scenario 1 (Worst Case), Canada, 1986-2036*

Year	Females ('000)	Total ('000)	Percent Female	Percent Change
1986	5,540	12,889	43.0	—
1991	6,231	13,980	44.6	8.46
1996	6,477	14,537	44.6	3.49
2001	6,667	14,993	44.5	3.13
2006	6,767	15,293	44.2	2.00
2011	6,772	15,384	44.0	0.59
2016	6,657	15,211	43.8	-1.1
2021	6,493	14,909	43.6	-2.0
2026	6,341	14,592	43.5	-2.1
2031	6,208	14,305	43.4	-2.0
2036	6,103	14,086	43.3	-1.5

*In Scenario 1, female age-specific labour force participation rates remain constant at the 1991 level throughout the projection period.

Exhibit 3.2

Labour Force Scenario 4 (Best Case), Canada, 1986-2036*

Year	Females ('000)	Total ('000)	Percent Female	Percent Change
1986	5,540	12,889	43.0	—
1991	6,321	14,069	44.9	9.16
1996	7,096	15,157	46.8	7.73
2001	7,605	15,932	47.7	5.11
2006	8,036	16,563	48.5	3.96
2011	8,549	17,161	49.8	3.61
2016	8,463	17,015	49.7	-0.85
2021	8,300	16,715	49.7	-1.8
2026	8,127	16,379	49.6	-2.0
2031	7,980	16,077	49.6	-1.8
2036	7,892	15,876	49.7	-1.3

*In Scenario 4, female age-specific labour force participation rates achieve equality with male labour force participation rates over the forecast period (1991-2036).

Women's Employment and Education: Patterns and Trends

Employment Patterns and Trends

The older women become, the less likely they are to be in the labour force. The participation rate for women aged 20 to 24 is 80.9%. The rate declines to 73.7% for women aged 25 to 34, 72.2% for women aged 35 to 44, 62.7% for women aged 45 to 54, 36.2% for women aged 55 to 64 and 4.7% for women aged 65 and over. (See Exhibit C.2 in Appendix C.) Clearly, there is considerable scope for higher levels of female participation, particularly in the older age groups.

The role of education in women's labour force participation cannot be overemphasized. The higher the level of education a women has attained, the more likely she is to be in the work force. Women with less than grade 9, for example, have a participation rate of 24.8%, while those with university degrees have a rate of 81.3%. (See Exhibit C.3 in Appendix C.)

Despite the steady climb in the number of women in Canada's labour force in recent years, they still find themselves heavily concentrated in clerical and service occupations. Of all women who worked in Canada in 1971, 30.3% held clerical and related jobs; in 1986, this figure had risen to 31.9%. The corresponding percentages of women in service occupations were 15.2% in 1971 and 16.5% in 1986. The occupational distribution for males is much more even. There is no evidence that men are concentrated in particular occupations as women are. (See Exhibit C.4 in Appendix C.)

Most women who are university graduates work in teaching and related occupations. In 1971, 40.3% of Canadian women with university degrees were so employed. By 1986, this percentage had dropped to 30.6%, but teaching and related occupations remained the main type of employment for women with degrees. Their next most significant form of employment is clerical and related occupations. In 1971, 15% of women with university degrees were employed in these occupations, and even by 1986, this percentage had dipped only slightly to 13.8%. (See Exhibit C.5 in Appendix C.)

As these figures indicate, the occupational concentration of university-educated women is remarkably persistent, although opportunities for advancement for women in teaching and related occupations have expanded somewhat in recent years. The fact that in 1986 clerical and related occupations were still the second most important source of employment for women with university degrees raises questions about whether or not public investment in higher education is paying adequate dividends.

What is needed to change this concentration is a broadening of educational opportunities for women so that they can participate in a full range of occupations at all levels.

Various educational and occupational barriers place women at a greater risk than men of being confined to low-wage clerical and service jobs that are often part-time and offer poor security and benefits. These continuing patterns of concentration partly explain the persistence of the gender wage gap. In 1980,

women who worked full-time earned 64.2% of the earnings of full-time male workers, and eight years later were earning only 65.3% of what men earned, a negligible gain. (See Exhibit C.6 in Appendix C.) This resultant gender gap in earnings adds to the burden of poverty. Studies have shown, for example, that elderly women are overrepresented among the poor in Canada. Expanding education and training opportunities for women will not only contribute to economic growth, but also reduce the spiralling costs of social assistance.

Education Patterns and Trends

Between 1981 and 1986, the distribution of women according to level of schooling gradually began to resemble more closely that of men. For example, while the proportion of men with a bachelor's degree or higher increased from 10.0 to 11.3%, the proportion of women with similar qualifications increased from 6.1 to 8.0% over the same period. At the other end of the spectrum, 17.6% of women, compared with 16.7% of men, had grade 8 education or less in 1986. This level of schooling is regarded as the borderline of functional illiteracy. (See Exhibit C.7 in Appendix C.)

The increased similarity between females and males in educational attainment shows up in the distribution of the female and male population by highest degree, certificate or diploma. For several types of qualifications, the distribution of women is now closer to that of men in 1986 than it was in 1981. These qualifications include medical degrees, university certificates or diplomas above the bachelor's level, bachelor's degrees, trades certificates, and high school graduation diplomas. In some cases, however, the gap between females and males widened. For example, while the proportion of males with earned doctorates rose from 0.5% to 0.6% between 1981 and 1986, the proportion of females with earned doctorates remained at 0.1%. (See Exhibit C.8 in Appendix C.)

Although females and males are becoming more alike in educational attainment, marked differences in major fields of study still exist. Among women who earned some form of postsecondary qualification in 1986, 4.7% were enrolled in programs in educational, recreational and counselling services, compared with 1.7% of men. While 5.6% of females were in secretarial sciences, only 0.4% of males were found in this field. The sharpest contrast was in engineering and applied science technologies and trades, where men continued to dominate; 14.4% of males were studying in this field but only 0.1% of females. In short, although females are approaching males in terms of *level* of educational attainment, there are still substantial differences in *fields of study* within these levels. (See Exhibit C.9 in Appendix C.)

Economic Implications of Alternative Labour Force Scenarios

This section takes the labour force scenarios a step further and estimates the impact they would have on Canada's level of prosperity if they become reality. It presents alternative pictures of the economy, one based on the worst-case scenario and the other on the best-case. Both pictures assume that increases

in labour force participation rates contribute to a rise in the GDP[4]. As women's rates of participation increase in each age group, there will be corresponding increases in GDP. As Exhibit 5.1 indicates, under the worst-case labour force scenario, GDP will increase from $504.6 billion in 1986 to $1,048.9 billion in 2011 and $1,326.0 billion in 2036. On an index where 1986 = 100, this represents an increase to 174.3 in 2011 and 211 in 2036.

The best-case scenario assumes, first, that women's rates of labour force entry and retention gradually draw closer to those of men, age group by age group, beginning with females now of school age; and second, that rates of entry, re-entry and retention are higher among older women as well, especially those aged 25 to 54. Eventually the pattern of women's participation more closely resembles that of men, until by the end of the forecast period (2036) it is identical to it.

Exhibit 5.1

Impact of Worst Case Labour Force Scenario on GDP and GDP/Person Canada, 1986-2036*

Year	GDP**	GDP/Population Index	Percent Change
1986	504.6	100.0	---
1991	618.6	116.3	16.3
1996	728.6	131.4	13.0
2001	852.3	148.8	13.2
2006	965.5	164.1	10.3
2011	1048.9	174.3	6.2
2016	1116.8	182.1	4.5
2021	1173.8	188.6	3.6
2026	1225.8	195.2	3.5
2031	1274.8	202.4	3.7
2036	1326.0	211.0	4.3

*In the worst case labour force scenario, female age-specific labour force participaton rates remain constant at the 1991 level throughout the projection period.

**In billions of 1986 dollars.

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[4] These alternatives were developed using the MEDS model, described in Appendix A. It helps researchers make long-term projections and analyses of the Canadian population, labour force and economy.

Exhibit 5.2

Impact of Best Case Labour Force Scenario on GDP and GDP/Person Canada, 1986-2036*

Year	GDP**	GDP/Population Index	Percent Change
1986	504.6	100.0	---
1991	620.3	116.7	16.7
1996	753.5	135.9	16.5
2001	912.3	159.2	17.2
2006	1073.0	182.3	14.5
2011	1216.3	202.1	10.8
2016	1316.5	214.6	6.2
2021	1401.3	225.2	4.9
2026	1476.7	235.2	4.4
2031	1546.9	245.6	4.4
2036	1621.1	258.0	5.0

*In the best case labour force scenario, female age-specific labour force participation rates achieve equality with male labour force participation rates over the forecast period (1991-2036).

**In billions of 1986 dollars.

Under this scenario, GDP increases to $1,216.3 billion in 2011 and $1,621.1 billion in 2036 (Exhibit 5.2). On the index, this represents an increase to 202.1 in 2011 and 258 in 2036. In short, under the best-case scenario GDP will be $168 billion larger in 2011 and $295 billion larger in 2036 than under the scenario in which women's labour force participation rates remain virtually unchanged. This optimistic forecast cannot be realized, however, unless much stronger and more comprehensive measures are taken to improve women's access to education and training opportunities. Without these, women simply will be unable to find jobs in sufficient numbers to reach the high levels of labour force participation envisioned in the best-case scenario.

Economic Implications of Diversifying Educational Opportunities for Women

The projections in Exhibits 5.1 and 5.2 illustrate the economic gains Canada could realize from achieving gender equality in labour force participation rates of men and women. This equality is based on participation by age group. The best-case scenario, for example, assumes equalized rates of entry and retention between men and women who are now of school age or who will be of school age over the forecast period. It also takes into account the effect of higher

rates of labour force entry, re-entry and retention among women currently older than school age. This scenario, however, does not consider the impact of changes in the occupational patterns of men and women. We therefore turn to a second question: what further gains might be made if women participated in the full range of occupations?

In an attempt to answer this question, we have developed a scenario under which the educational composition of women becomes the same as that of men over the forecast period (1991-2036). We call this the "equal educational composition" scenario[5]. We applied this scenario to the best-case labour force forecast to see what, if any, further GDP gains might be realized. The result was a rise in GDP from $504.6 billion in 1986 to $1,659.6 billion in 2036 (Exhibit 6.1). Under the best-case labour force scenario, *without* the equal educational composition assumption, GDP rose to $1,621.1 billion in 2036. The achievement of equality in the education of women and the consequent equality in occupational distribution would add another $38.5 billion of GDP by the end of the forecast period.

Exhibit 6.1

Impact of Equal Educational Composition on GDP and GDP/Person, When Applied to the Best Case Labour Force Scenario, Canada, 1986-2036*

Year	GDP**	GDP/Population Index	Percent Growth
1986	504.6	100.0	—
1991	621.0	116.8	16.8
1996	755.8	136.3	16.7
2001	917.3	160.1	17.4
2006	1081.8	183.9	14.8
2011	1229.8	204.3	11.1
2016	1334.4	217.6	6.5
2021	1423.8	228.8	5.2
2026	1504.2	239.6	4.7
2031	1579.7	250.8	4.7
2036	1659.6	264.1	5.3

* In the best case labour force scenario, female age-specific labour force participation rates achieve equality with male labour force participation rates over the forecast period (1991-2036).

**In billions of 1986 dollars.

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[5] This scenario, described in Appendix D, involves a complex procedure that assumes the continuance into the future of a number of current trends.

Conclusion: Policy implications

The education sector faces a huge challenge in preparing Canadians, boys and girls, women and men, for the global economy of the twenty-first century. Furthermore, this challenge must be met in the face of serious financial constraints.

The economic analysis presented in this paper provides a strong incentive for achieving equality in education for girls and women. In essence, Canada's future prosperity is dependent on the knowledge and skills of its labour force. With women projected to constitute 50% of the labour force by the turn of the century, Canada cannot ignore the significant potential of half its workers. The following findings discussed in this paper raise a number of educational issues which must be addressed if women are to be given the opportunity to fully contribute to the labour force.

1. **The educational choices of girls and women tend to channel them into a narrow range of occupations.**

   - What initiatives can be undertaken to broaden educational choices for girls and young women?
   - What do we know, and what do we need to know, about the way in which girls and young women make their educational choices?
   - What factors influence the educational and training choices of older women?
   - What services could be provided to broaden educational opportunities for girls and women?

2. **Certain scientific and technological disciplines are particularly unlikely to attract or retain the female student.**

   - What suitable strategies could encourage young girls and women to enter disciplines where they are currently under-represented?
   - What changes could be made to the learning environment to make these disciplines more hospitable to women?

3. **Female labour force participation varies significantly by age and level of education.**

   - What initiatives are needed for training and re-training older women?
   - What initiatives are needed to promote retention of young women in the educational system?
   - What strategies could be developed to encourage women to attain higher educational levels?

4. **The Canadian labour force will decline even more dramatically in the next century if current levels of immigration are not maintained. This indicates continued high levels of immigration, particularly to Canada's "magnet cities" such as Montreal, Toronto and Vancouver. Half of these immigrants are projected to be women.**

   - What changes must be made to ensure that the educational environment meets the needs of immigrant girls and women?

   - What mechanisms can be developed to recognize the international credentials of immigrants in order that they can fully contribute their knowledge and skills?

5. **At every level, from basic education to advanced degree programs, education systems must respond to the needs of older students.**

   - What initiatives should be undertaken to ensure that women and men are able to balance their work and family responsibilities while engaged in education and retraining? What intergovernmental cooperation is needed to support the educational systems' efforts in this area?

   - Women with low educational levels are half as likely as men with low educational levels to be in the work force. How can these women's needs for basic education be addressed?

   - How should retraining initiatives consider the needs of older, even elderly, women?

These, and other educational issues, have been recognized by governments as legitimate areas for action. For instance, in 1986, First Ministers endorsed a document entitled *Towards a Labour Force Strategy: A Framework for Training for Women*, which outlined a number of measures to achieve equality in education and training for girls and women. Subsequently, all governments implemented a variety of policy and program initiatives to that end. Two of the documents produced by governments that provide recommendations relevant to some of the issues identified in this paper are *The Participation of Girls and Women in Math, Science and Technology*, and the *Report of the Collaborative Action Working Group on Counselling*.

It is hoped that the reader will acquire a greater understanding of the urgency of strengthening all levels of the education system in order that girls and women receive the knowledge and skills necessary to fully participate in and contribute to the twenty-first century economy.

Appendix A: A Projection of the Canadian Population (to 2036): Procedures and Assumptions

Our population projection has been prepared using the MEDS model. MEDS stands for Models of the Economic-Demographic System and was developed in connection with the Canadian Demographic Review recently concluded by Health and Welfare Canada.[1]

MEDS provides researchers with a series of models which provide capabilities for long term projections and analysis of the Canadian population, labour force and economy. Specifically, MEDS allows us to answer such questions as "how much difference would achieving male-female equality in educational composition by the year 2016 have on the economy?". By exploring questions such as these, we are able to develop estimates of the economic benefits of pursuing policies which achieve these goals. With such information in place, policy makers can then weigh such benefits against the costs of implementing related policies. MEDS has been used to prepare all of the projections presented in this paper.

The population projection (to 2036) presented in exhibit 2.2 of the main text of the paper is based on the following assumptions:

1. The total fertility rate remains at 1.670 births per woman,

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[1] For a description of the MEDS model, see MEDS 1.5: Users' Manual, Frank T. Denton, Christine H. Feaver, and Byron G. Spencer, McMaster University, Hamilton, Ontario, January 1990. Also see Health and Welfare Canada, Charting Canada's Future: A Report of the Demographic Review, Ottawa, Minister of Supply and Services, 1989.

its most recent level; the age pattern of fertility is the same as in 1986.

2. Age-specific mortality rates continue to decline in accordance with recent historical experience; however, the rates of decline are somewhat lower for women than for men. In particular, age-specific male rates decline throughout the 50-year projection period at the average annual percentage rates observed during the 20-year period 1961-81 while female rates decline more slowly, reaching half the 1961-81 average annual rate of change by 2011 and one-quarter of the 1961-81 rate by 2036.

3. Total immigration is at the rate of 125,000 per year and emigration is at an annual rate of one-quarter of one percent of the previous year's population; the age-sex composition of immigration and emigration is based on the observed pattern over the period 1981-86.

4. The labour force participation rates of men in the older age groups continue to decline, reflecting the trend towards earlier retirement, and the rates for women in most age groups continue to rise. Changes in rates diminish gradually, year by year, and cease altogether by 2011.

Appendix B: Labour Force Forecasts (to 2036): Procedures and Assumptions

The MEDS Model, which was described in Appendix A, was used to produce the four labour force scenarios described below.

Scenario 1: The labour force participation rate for each female age group remains constant at 1991 levels over the entire projection period (1986 to 2036). This is the worst case scenario which addresses the question: what will the labour force look like in the future if the current level of inequality is sustained over the entire projection period. Exhibit B.1 shows the values for this scenario. While the labour force participation rates for younger female age groups are assumed to be similar to their male counterparts over the entire projection period, the labour force participation rate for older women is assumed to be significantly lower than for older men. For example, the labour force participation for women in the 45-54 year age group is assumed to be 69.5%, as contrasted with 92.1% among men in the same age group.

Scenario 2: Under this scenario the labour force participation of men in older age groups continues to decline, reflecting the trend towards earlier retirement. The rates for women in most age groups continue to rise. Exhibit B.2 shows the implications of this scenario. We interpret this as the second to worst case scenario which shows the implications of projecting the current policy-mix into the future.

Scenario 3: This scenario shows the potential impact of a policy-mix which has the effect of equalizing the labour force participation rates of each age cohort which reaches labour force age from now into the future. For the population that will be older than age 24 in 1991, female labour force participation is assumed to take the same values as those presented in Scenario 2. However, for the population that is younger than age 24 in 1991, female labour force participation is assumed to take the same values as male labour force participation. Exhibit B.3 shows the values for this scenario. We interpret this scenario as showing the consequences of a policy-mix which accomplishes the following for those who are either now of school age (less than 24) or will be of school age over the projection period:

- males and females have equal rates of entry into the labour force; and
- among those who enter into the labour force for the first time during the projection period, males and females are equally likely to remain in the labour force.

Scenario 4: This scenario is the same as Scenario 3, with the following amendment. In addition to equalized rates of entry and retention among those who are either now of school age or will be of school age over the projection period, this scenario investigates the effects of higher rates of labour force entry, re-entry and retention among those who are currently older than school age. A comparison of exhibits B.4 and B.3 shows how this assumption differs from scenario 3. While the labour force

participation rates are the same in 2036 under both scenarios, the labour force participation rates for women are generally higher in the intermediate years in scenario 4 than in scenario 3.

EXHIBIT B.1

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — MALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	76.8	56.0	84.8	94.4	94.9	91.6	68.7	18.5	7.6
1991	76.4	58.8	85.2	94.2	95.0	92.1	64.6	17.0	7.0
1996	75.5	58.8	85.2	94.2	95.0	92.1	63.1	15.8	6.5
2001	74.5	58.8	85.2	94.2	95.0	92.1	62.1	14.8	6.0
2006	73.2	58.8	85.2	94.2	95.0	92.1	61.6	14.1	5.5
2011	71.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2016	69.4	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2021	67.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2026	65.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2031	63.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2036	62.7	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — FEMALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	55.4	52.7	76.8	73.6	72.3	60.8	33.5	7.1	1.9
1991	58.6	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
1996	57.7	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2001	56.7	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2006	55.1	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2011	53.3	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2016	51.2	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2021	49.2	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2026	47.5	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2031	46.2	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
2036	45.3	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8

EXHIBIT B.3

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — MALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-2

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	76.8	56.0	84.8	94.4	94.9	91.6	68.7	18.5	7.6
1991	76.4	58.8	85.2	94.2	95.0	92.1	64.6	17.0	7.0
1996	75.5	58.8	85.2	94.2	95.0	92.1	63.1	15.8	6.5
2001	74.5	58.8	85.2	94.2	95.0	92.1	62.1	14.8	6.0
2006	73.2	58.8	85.2	94.2	95.0	92.1	61.6	14.1	5.5
2011	71.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2016	69.4	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2021	67.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2026	65.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2031	63.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2036	62.7	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — FEMALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-2

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	55.4	52.7	76.8	73.6	72.3	60.8	33.5	7.1	1.9
1991	59.4	58.8	85.2	77.0	79.2	69.5	35.6	6.5	1.8
1996	58.5	58.8	85.2	77.0	79.2	69.5	35.6	6.5	1.8
2001	62.8	58.8	85.2	94.2	86.0	76.5	35.6	5.5	1.6
2006	61.0	58.8	85.2	94.2	86.0	76.5	35.6	5.5	1.6
2011	60.9	58.8	85.2	94.2	95.0	80.1	35.6	4.5	1.4
2016	59.9	58.8	85.2	94.2	95.0	82.5	40.7	6.3	2.1
2021	59.1	58.8	85.2	94.2	95.0	84.9	45.8	8.1	2.8
2026	58.5	58.8	85.2	94.2	95.0	87.3	50.9	9.9	3.6
2031	58.2	58.8	85.2	94.2	95.0	89.7	56.0	11.7	4.3
2036	58.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

12H

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90)

MALES
DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	76.8	56.0	84.8	94.4	94.9	91.6	68.7	18.5	7.6
1991	76.4	58.8	85.2	94.2	95.0	92.1	64.6	17.0	7.0
1996	75.5	58.8	85.2	94.2	95.0	92.1	63.1	15.8	6.5
2001	74.5	58.8	85.2	94.2	95.0	92.1	62.1	14.8	6.0
2006	73.2	58.8	85.2	94.2	95.0	92.1	61.6	14.1	5.5
2011	71.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2016	69.4	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2021	67.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2026	65.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2031	63.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2036	62.7	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90)

FEMALES
DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	55.4	52.7	76.8	73.6	72.3	60.8	33.5	7.1	1.9
1991	58.6	56.2	78.3	77.0	79.2	69.5	35.6	6.5	1.8
1996	60.1	56.2	80.3	81.0	83.2	73.5	35.6	6.0	1.7
2001	60.7	56.2	82.3	84.0	86.0	76.5	35.6	5.5	1.6
2006	60.1	56.2	83.8	86.0	88.1	78.6	35.6	5.0	1.5
2011	58.8	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4
2016	56.3	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4
2021	54.0	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4
2026	52.1	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4
2031	50.7	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4
2036	49.8	56.2	85.1	87.0	89.5	80.1	35.6	4.5	1.4

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — MALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	76.8	56.0	84.8	94.4	94.9	91.6	68.7	18.5	7.6
1991	76.4	58.8	85.2	94.2	95.0	92.1	64.6	17.0	7.0
1996	75.5	58.8	85.2	94.2	95.0	92.1	63.1	15.8	6.5
2001	74.5	58.8	85.2	94.2	95.0	92.1	62.1	14.8	6.0
2006	73.2	58.8	85.2	94.2	95.0	92.1	61.6	14.1	5.5
2011	71.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2016	69.4	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2021	67.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2026	65.2	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2031	63.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0
2036	62.7	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

MEDS1 TABLE 10: PROJECTED LABOUR FORCE OF CANADA BY AGE — FEMALES
ASSUMPTIONS: STANDARD (AS OF 31/JAN/90) — DATE: 1990- 6-

YEAR	TOTAL	AGE GROUP							
		15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+
		- PARTICIPATION RATES (%) -							
1986	55.4	52.7	76.8	73.6	72.3	60.8	33.5	7.1	1.9
1991	59.4	58.8	85.2	77.0	79.2	69.5	35.6	6.5	1.8
1996	63.3	58.8	85.2	94.2	83.2	73.5	35.6	6.0	1.7
2001	64.6	58.8	85.2	94.2	95.0	76.5	35.6	5.5	1.6
2006	65.5	58.8	85.2	94.2	95.0	92.1	35.6	5.0	1.5
2011	67.3	58.8	85.2	94.2	95.0	92.1	61.1	4.5	1.4
2016	65.1	58.8	85.2	94.2	95.0	92.1	61.1	6.3	2.1
2021	62.8	58.8	85.2	94.2	95.0	92.1	61.1	8.1	2.8
2026	60.8	58.8	85.2	94.2	95.0	92.1	61.1	9.9	3.6
2031	59.3	58.8	85.2	94.2	95.0	92.1	61.1	11.7	4.3
2036	58.6	58.8	85.2	94.2	95.0	92.1	61.1	13.5	5.0

12H(2)

Appendix C: Women's Employment and Education Patterns and Trends: Exhibits

12K

EXHIBIT C.2

Female Labour Force Participation Rates by Age Group, Canada, 1986

(Percentages)

Age Group	Labour Force Participation Rate
Total	55.9
15-19	45.6
20-24	80.9
25-34	73.7
35-44	72.2
45-54	62.7
55-64	36.2
65 and over	4.7

Source: 1986 Census, Statistics Canada, Women and the Labour Force, Catalogue 98-125, page 17.

12L

EXHIBIT C.3

Female Labour Force Participation Rates by Education, Canada, 1986

(Percentages)

Education	Labour Force Participation Rate
Total	55.9
Less than Grade 9	24.8
Grade 9-13 without certificate or diploma	46.4
Grade 9-13 with certificate or diploma	63.3
Trade certificate or diploma	69.7
Some university or other non-university without certificate or diploma	68.7
University or other non-university with certificate or diploma	74.9
University degree	81.3

Source: 1986 Census, Statistics Canada, Women and the Labour Force, Catalogue 98-125, page 17.

12M

EXHIBIT C.4

Occupational Group by Sex, Canada, 1971, 1981, 1986 (Percentage)

Occupational Group	Female			Male		
	1971	1981	1986	1971	1981	1986
Managerial, administrative and related occupations	1.8	3.9	5.6	5.2	8.3	9.2
Occupations in natural sciences, engineering and mathematics	.6	1.1	1.5	3.7	4.8	5.1
Occupations in social sciences and related fields	1.1	2.0	2.5	.9	1.2	1.4
Teaching and related occupations	6.8	5.9	5.9	2.5	2.8	2.7
Occupations in medicine and health	7.8	8.0	8.2	1.5	1.6	1.7
Artistic, literary, recreational and related occupations	.8	1.4	1.6	1.0	1.5	1.6
Clerical and related occupations	30.3	34.1	31.9	7.6	7.0	6.6
Sales occupations	8.3	9.9	10.1	9.8	9.4	9.8
Service occupations	15.2	16.2	16.5	9.3	9.8	10.3
Farming, horticultural and animal husbandry occupations	4.5	2.4	2.5	7.1	5.7	5.8
Other primary occupations	.1	.2	.2	2.8	2.8	2.7
Processing occupations	2.1	2.2	2.0	4.9	5.2	4.4
Machining and product fabricating, assembling & repairing occupations	5.5	5.1	4.4	12.3	13.6	13.0
Construction trades occupations	.2	.3	.4	9.6	10.5	9.8
Transport equipment operating occupations	.2	.6	.6	6.0	5.8	5.7
Other occupations	2.6	2.6	2.4	7.4	6.7	6.9
Occupation not stated	12.3	4.1	3.8	8.4	3.6	3.5
Total (N)	37,059	111,338	122,134	61,307	151,935	155,112

Source: 1986 Census of Canada; tabulation prepared from Public Use Sample Tape.

12N

EXHIBIT C.5

Occupational Group by Sex, Canada, University Graduates, 1971, 1981, 1986 (Percentage)

Occupational Group	Female			Male		
	1971	1981	1986	1971	1981	1986
Managerial, administrative and related occupations	5.6	9.3	11.7	19.7	22.2	23.7
Occupations in natural sciences, engineering and mathematics	4.0	4.1	5.1	16.6	16.6	15.9
Occupations in social sciences and related fields	7.2	8.8	8.8	7.1	7.3	7.0
Teaching and related occupations	40.3	35.1	30.6	20.9	18.6	16.4
Occupations in medicine and health	11.0	10.3	11.0	10.8	7.7	7.0
Artistic, literary, recreational and related occupations	2.4	3.6	3.8	1.4	2.6	2.5
Clerical and related occupations	15.0	14.8	13.8	4.4	4.1	4.5
Sales occupations	2.8	4.7	5.1	5.3	6.7	7.5
Service occupations	3.4	2.9	3.5	2.8	2.3	3.3
Farming, horticultural and animal husbandry occupations	.7	.9	.7	.7	1.3	1.3
Other primary occupations	-	.1	.1	.4	.4	.3
Processing occupations	.4	.3	.3	1.1	.8	.8
Machining and product fabricating, assembling & repairing occupations	.5	.6	.6	1.3	1.4	1.6
Construction trades occupations	.1	.1	.1	1.4	1.3	1.3
Transport equipment operating occupations	.1	.1	.2	.6	.7	.9
Other occupations	1.2	1.9	1.7	2.1	3.4	3.6
Occupation not stated	5.4	2.5	2.9	3.4	2.0	2.3
Total (N)	1,796	9,708	13,740	4,573	17,366	20,311

Source: 1986 Census of Canada; tabulation prepared from Public Use Sample Tape.

EXHIBIT C.6

Female to Male Earnings Ratios (in Per Cent) for Full-year Full-time Earners, Canada, 1980 to 1988

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Canada	64.2	63.7	64.0	64.6	65.6	64.9	65.8	65.9	65.3

Source: Statistics Canada, Earnings of Men and Women, 1988, Catalogue 13-217 Annual, p. 12.

12P

EXHIBIT C.7

Highest Level of Schooling by Sex, Canada, 1981 and 1986 (Percentage)

Highest Level of Schooling	Female		Male	
	1981	1986	1981	1986
Elementary-secondary only				
Less than Grade 5	4.3	3.4	4.1	3.2
Grades 5-8	16.2	14.2	15.4	13.5
Grades 9-13	28.7	27.9	26.9	26.5
Secondary (high) school graduation certificate	15.1	14.3	10.9	11.3
Trades certificate or diploma	1.7	2.0	5.1	4.1
Other non-university education only				
Without trades or other non-university certificate or diploma	6.4	7.0	5.6	6.6
With trades certificate or diploma	5.0	4.7	7.9	7.9
With other non-university certificate or diploma	8.8	9.8	5.8	6.6
University				
Without certificate, diploma or degree	3.2	3.8	4.2	4.5
With certificate or diploma	4.5	5.0	4.0	4.5
With bachelor's degree or higher	6.1	8.0	10.0	11.3
Total (N)	189,137	201,026	182 993	191,654

Source: 1986 Census of Canada; tabulation prepared from Public Use Sample Tape.

12Q

EXHIBIT C.8

Highest Degree, Certificate or Diploma by Sex, Canada, 1981, 1986 (Percentage)

Highest Degree, Certificate or Diploma	Female		Male	
	1981	1986	1981	1986
No degree, certificate or diploma	52.3	48.8	49.6	46.7
Secondary (high) school graduation certificate	21.5	21.8	17.5	18.9
Trades certificate or diploma	7.3	7.3	14.0	12.9
Other non-university certificate or diploma	10.7	12.0	7.5	8.5
University certificate or diploma below bachelor level	2.0	2.3	1.4	1.7
Bachelor's degree(s)	4.4	5.8	6.1	7.0
University certificate or diploma above bachelor level	.7	.8	1.1	1.1
Degree in medicine, dentistry, veterinary medicine or optometry	.1	.2	.6	.6
Master's degree	.7	1.0	1.7	2.0
Earned doctorate	.1	.1	.5	.6
Total (N)	189,137	201,026	182,993	191,654

Source: 1986 Census of Canada; tabulation prepared from Public Use Sample Tape.

12 R

EXHIBIT C.9

Major Field of Study by Sex, Canada, 1986 (Percentages)

Major Field of Study	Female	Male
Educational, recreational and counselling services	4.7	1.7
Fine and applied arts	2.4	1.2
Humanities and related fields	2.3	1.9
Social sciences and related fields	2.3	2.8
Secretarial science - general fields	5.6	.4
Other commerce, management and business administration	3.2	5.0
Agricultural and biological sciences/technologies	1.4	1.8
Engineering and applied sciences	.1	2.2
Engineering and applied science technologies and trades	1.0	14.4
Nursing and nursing assistance	4.3	.2
Other health professions, sciences and technologies	1.4	1.2
Mathematics and physical sciences	.6	1.5
All other	.1	.1
No postsecondary qualification	70.7	65.6
Total (N)	201,026	191,654

Source: 1986 Census of Canada; tabulation prepared from Public Use Sample Tape.

Appendix D: Development of the Equal Educational Composition Assumption: Procedures and Assumptions

The projections to test the economic implications of the female educational desegregation have been prepared using the MEDS model which has been described in Appendix A. The starting point for the development of these projections is the educational composition variable which is available in the model. The educational composition variable,[1] which is defined as the highest level of schooling attained, assumes the following five positions in the model:

E1: Grade 8 or less.

E2: Grades 9 to 13.

E3: Secondary school graduation certificate, Secondary trades certificate or diploma, Non-university post-secondary, without trades certificate or diploma, or Non-university post-secondary, with trades certificate or diploma.

E4: Non-university post-secondary, with other trades certificate or diploma; University, without certificate, diploma, or degree; University, with certificate or diploma.

E5: University, with bachelor's degree or higher.

Exhibit D.1 shows the proportion of the Canadian population in

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1 For further information on the educational composition variable, see Frank T. Denton, Christine H. Feaver, and Byron G. Spencer, MEDS 5.1 Users' Manual, Hamilton, McMaster University, January 1990, page 8.

1986 at each level of education, broken down by gender and age groupings. The exhibit clearly shows the differences in educational composition between the female and male populations.

The MEDS model provides a "base case" scenario which projects, out to 2036, the female/male educational composition in Canada. This projection is based on various assumptions about past trends continuing into the future. Exhibit D.2 shows, for 2006 and 2036, the proportion of the Canadian population at each level of education, broken down by gender and age groupings. The numbers presented in Exhibit D.2 are the assumptions for the base case projection of the MEDS model and clearly show continuing female/male educational composition differences.

To test the economic implications of female educational desegregation, we have developed an alternative projection in which the female educational composition becomes the same as that of the male educational composition over the forecast period (1991-2036). The numerical assumptions for this projection are presented in Exhibit D.3.

The next step in our analysis is to examine the productivity implications of eliminating educational segregation along gender lines. The MEDS model has a variable which measures the differences in the relative productivities of females and males. These relative productivity weights are based on wages and salaries as reported by full-time full-year workers in the 1986 Census of Canada.[2] Relative productivity is expected to change over time as each age-sex-education group is affected by changes in its

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[2] Ibid., Page 9.

involvement in part-time relative to full-time work and also by changes in the relative number of hours worked. The left hand side of exhibit D.4 shows the implications of these changes in the base case scenario of the MEDS model. Under the base case, the difference in female and male productivity is reduced by one-half by 2006. This difference remains constant between 2006 and 2036.

However, the difference in male and female productivity is also related to differences in educational and occupational outcomes. Economic analyses, as summarized in the Ontario Green Paper on Pay Equity[3], show that for each dollar earned by the average full-time full-year male worker, the average full-time full-year female worker in the early 1980s earned about 62 cents. Of the 38 cent shortfall, 16 cents (42%) is due to the differences in hours of work, between 10 and 15 cents (between 26 and 39%) is due to occupational segregation, between 5 and 10 cents (between 13 and 26%) is due to differences in education and experience, and 5 cents (13%) is due to direct wage discrimination. The effect on productivity of reducing educational segregation will be felt in terms of a reduction in the male and female differences in the earnings of full-time full-year workers which are attributable to occupational segregation and education and experience.

The above suggests that between 15 and 25 cents (between 39% to 65%) out of the 38 cent shortfall in wages and salaries of full-time full-year workers in Canada can be attributed to occupational segregation and differences in education and experience. We assume

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3 Ontario, Minister Responsible for Women's Issues, Green Paper on Pay Equity, Toronto, 1985, page 10.

that a relatively small proportion of this shortfall can be addressed directly (over and above the base case) by eliminating educational segregation.

As exhibit D.4 shows, we assume that a further 15% of the difference between female and male relative productivities can be eliminated by achieving educational desegregation. Of this 15%, 5% will be achieved by 2006, and another 10% will be achieved by the year 2036. Whereas the MEDS model base case posits that 50% of the male/female productivity difference will be eliminated by 2006, our assumption posits that a further 5% (i.e. 55%) of this difference will be eliminated. Whereas the MEDS model base case again posits that 50% of the male/female productivity difference will be eliminated by 2036, our assumption posits that a further 10% (i.e. 65%) of this difference will be eliminated by 2036.

Exhibit 6.1 in the main text shows the further GDP gains that can be realized by equalizing female/male educational composition.

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EXHIBIT D.1

Educational Composition for Females and Males by Age Cohort, Canada, 1986

Age Cohort	Females					Males				
	1986									
	E1*	E2	E3	E4	E5	E1	E2	E3	E4	E5
15-19	.05	.61	.26	.07	.00	.07	.65	.23	.05	.00
20-24	.03	.21	.37	.31	.08	.04	.26	.38	.25	.07
25-34	.05	.23	.34	.24	.14	.05	.23	.36	.21	.15
35-44	.12	.23	.31	.23	.12	.11	.19	.32	.19	.19
45-54	.24	.27	.25	.17	.06	.24	.21	.29	.13	.12
55-64	.35	.28	.21	.12	.04	.35	.22	.24	.10	.09
65-69	.39	.28	.19	.10	.03	.40	.23	.22	.09	.07
70+	.44	.27	.17	.09	.03	.46	.22	.19	.07	.06

* E1: Grade 8 or less
E2: Grade 9-13
E3: Secondary school graduation or some non-university post-secondary
E4: University with a degree or selected other post-secondary
E5: Completed bachelor's degree or higher

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EXHIBIT D.2

Educational Composition Assumptions for Females and Males by Age Cohort, Base Assumptions of the MEDS Model, Canada, 2006, 2036

Age Cohort	Females					Males				
					2006					
	E1*	E2	E3	E4	E5	E1	E2	E3	E4	E5
15-19	.03	.61	.29	.07	.00	.04	.63	.25	.08	.00
20-24	.03	.20	.38	.30	.09	.04	.26	.38	.25	.07
25-34	.04	.20	.33	.26	.17	.04	.24	.35	.21	.16
35-44	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
45-54	.04	.22	.34	.24	.15	.05	.23	.36	.21	.15
55-64	.12	.23	.31	.23	.11	.11	.19	.32	.19	.19
65-69	.23	.28	.26	.17	.06	.22	.21	.30	.14	.13
70+	.26	.27	.24	.17	.06	.26	.22	.28	.12	.12
					2036					
15-19	.03	.61	.29	.07	.00	.04	.63	.25	.08	.00
20-24	.03	.20	.38	.30	.09	.04	.26	.38	.25	.07
25-34	.04	.20	.33	.26	.17	.04	.24	.35	.21	.16
35-44	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
45-54	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
55-64	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
65-69	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
70+	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18

* E1: Grade 8 or less
E2: Grade 9-13
E3: Secondary school graduation or some non-university post-secondary
E4: University with a degree or selected other post-secondary
E5: Completed bachelor's degree or higher

EXHIBIT D.3

Educational Composition Assumptions for Females and Males by Age Cohort, Equal Female/Male Educational Compositions, Canada, 2006, 2036

Age Cohort	Females					Males				
					2006					
	E1*	E2	E3	E4	E5	E1	E2	E3	E4	E5
15-19	.04	.63	.25	.08	.00	.04	.63	.25	.08	.00
20-24	.04	.26	.38	.25	.07	.04	.26	.38	.25	.07
25-34	.04	.24	.35	.21	.16	.04	.24	.35	.21	.16
35-44	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
45-54	.04	.22	.34	.24	.16	.05	.23	.36	.21	.15
55-64	.12	.23	.31	.23	.11	.11	.19	.32	.19	.19
65-69	.23	.28	.26	.17	.06	.22	.21	.30	.14	.13
70+	.26	.27	.24	.17	.06	.26	.22	.28	.12	.12
					2036					
15-19	.04	.63	.25	.08	.00	.04	.63	.25	.08	.00
20-24	.04	.26	.38	.25	.07	.04	.26	.38	.25	.07
25-34	.04	.24	.35	.21	.16	.04	.24	.35	.21	.16
35-44	.05	.25	.32	.20	.18	.05	.25	.32	.20	.18
45-54	.05	.25	.32	.20	.18	.05	.25	.32	.20	.18
55-64	.05	.25	.32	.20	.18	.05	.25	.32	.20	.18
65-69	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18
70+	.04	.20	.33	.26	.17	.05	.25	.32	.20	.18

* E1: Grade 8 or less
E2: Grade 9-13
E3: Secondary school graduation or some non-university post-secondary
E4: University with a degree or selected other post-secondary
E5: Completed bachelor's degree or higher

EXHIBIT D.4

Relative Productivity Assumptions, Base Assumptions of the MEDS Model, and Equal Female/Male Educational Compositions, Canada, 2006, 2036

Year	Base Assumption*	Equal Female/Male Educational Compositions
1986	0.00	0.00
2006	0.50	0.55
2036	0.50	0.65

* The relative productivity parameter allows for adjustments over time in the inital (1986) difference between male and female productivity. A value of 0.5 implies that half this difference is removed. A value of 1.0 implies that all the difference is removed. The base assumption suggests that half the difference between male and female productivity will be removed by 2006 and that relative productivity will remain constant over the 2006 to 2036 period. The equal female/male educational composition assumption suggests that another 15% of the difference in relative productivity will be removed by achieving equality in educational composition. Five percent of this difference will be achieved by 2006, and the remaining 10% will be achieved by 2036.